Abstract
We estimate the source model of the M7.2 interplate earthquake which occurred offshore of Miyagi Prefecture (Miyagi-Oki region), northeast Japan, from broadband strong motion modeling using the empirical Green's function (EGF) method (Irikura, 1986; Miyake et al., 2003). The source model is composed of two strong motion generation areas (SMGAs1 and SMGAs2). SMGA represents a large slip-velocity area within the total rupture area and has successfully explained the observed broadband waveforms. Location of SMGA is determined using the arrival time difference between the first motion and the first main phase in the P-wave portion (Takanaka et al., 2000). Then, we estimate the size, rise time, rupture propagation direction of SMGAs, and the rupture starting point of SMGAs by fitting the synthetic waveforms into the observed ones for the S-wave portion over wide frequency range. This is achieved by minimizing the sum of the misfits of the velocity waveforms (0.2-1.0Hz) and the acceleration envelopes (0.2-10Hz) using the genetic algorithm. SMGAs correspond to the two major large slip areas estimated from waveform inversion (Wu and Koketsu, 2006). This indicates that broadband strong motions are radiated from the concentrated areas on the fault. Stress drop of the shallower SMGA1 is 17.6MPa while that of the deeper SMGA2 is 34.1MPa. Comparison with the distribution of SMGAs of the previous 1978 Miyagi-Oki earthquake estimated by Kanam et al. (2002) shows that two SMGAs of the 1978 event do not overlap those of the 1978 event. M6-8 class interplate earthquakes, including the 2005 Miyagi-Oki one, have smaller SMGAs than crustal earthquakes for the same seismic moment, which indicates that SMGA...